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ABSTRACT

Volume 1 of this study describes and costs two possible satellite networks which could be used in education in Canada. In order to determine whether these networks were plausible or useful, a letter and a description of the two hypothetical networks were sent, before the cost study was completed, to all Canadian Universities and provincial Departments of Education, as well as to other bodies likely to be interested. This report contains that letter, the network descriptions, and the replies in their original language--French or English. (DAG)

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THE IMPLICATIONS OF THE EDUCATIONAL EXPERIMENTS CONDUCTED ON THE COMMUNICATIONS TECHNOLOGY SATELLITE

John S. Daniel - Principal researcher

THE USE OF SATELLITE DELIVERY SYSTEMS IN EDUCATION IN CANADA: THE COSTING OF TWO NETWORKS AND A PRELIMINARY NEEDS SURVEY

VOLUME 2

A PRELIMINARY NEEDS SURVEY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

John S. Daniel

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

Department of Communications, Canada
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PURPOSE AND METHODOLOGY OF THIS SURVEY

Volume 1 of this study costs two possible satellite networks which could be of use in education in Canada. In order to determine whether these networks are plausible or useful in the opinion of Canadian educators, the following letter and summary of our intentions was sent, before the cost study was completed, to all Canadian Universities and provincial Departments of Education as well as to other bodies likely to be interested.

The replies received at the time this report went to press are presented in the original langage at the end of the french version of this document (p.10). In accordance with our promise to respondents, we have blanked out references likely to reveal an institution's identity.

Now that the results of the cost study and of this survey are available, we invite respondents and others to pursue their reflection on satellites in Canadian education and to let us have further comments in the light of this new information.

Dear Sir,

Satellites in Canadian Education

As befits a country that depends vitally on communications, Canada was the first nation to have a domestic satellite system and is among the leaders in communications satellite technology. Satellites can abolish distance as no previous technology has done and it is in the field of education that the public could reap some of the benefits from the investment of its taxes in the national space effort.

We are presently evaluating the educational experiments being conducted in Canada on the Communications Technology Satellite (Hermès) and the aim of this work is to produce models for the use of satellites in education in the country. The evidence already indicates that satellites can extend educational opportunities but in order to construct a sensible model for future applications we need more information about the real needs.

Instead of conducting a classical needs survey, we decided it would be simpler and more effective to make hypotheses about possible satellite networks and to ask institutions and organizations across Canada to react to these. The enclosed working paper describes two networks which we are in the process of costing. We invite you to circulate this paper for discussion within your institution and to ask those of your colleagues with interests in this area to let us have their comments.

We are particularly interested in obtaining answers to the following questions:

- Is either of these networks plausible?
- What other networks could be useful?

Naturally these questions are not restrictive and we will be pleased to receive reactions to any of the issues raised. All replies will be treated in confidence and presented in an aggregate manner only. We are not asking for formal statements of your institution's position on satellite communications.

We hope to receive replies by mid-March 1977 so that a summary of comments received can be included in the report on the cost study. Since the CRTC is to hold hearings into the proposed merger between Telesat and the Trans Canada Telephone System in the fall this is an appropriate time for educators to reflect on the form they would like satellite communications services to take.

Yours truly,

John S. Daniel

THE USE OF SATELLITE DELIVERY SYSTEMS IN EDUCATION IN CANADA: COSTING OF TWO NETWORKS

1. INTRODUCTION

Canada is a leader in the development and use of communications satellites. At present many educational institutions across the country are conducting experiments on the latest Communications Technology Satellite (Hermes) and a team led by John Daniel (Télé-université, Québec) and Murray Richmond (Athabasca University, Alberta) is evaluating these experiments in order to determine their implications for the future use of satellites in Canadian education.

In order to construct a realistic model for satellite applications in education it is clearly necessary to have information on the present and future needs of various institutions and organizations and to cost systems for meeting these needs.

Given the methodological difficulties of conducting a meaningful needs survey in this new and fast developing domain, the evaluation team has decided to make hypotheses about the satellite delivery systems likely to be of interest to Canadian education and to cost these systems.

We intend that this description of the study to be conducted should serve as a working paper to which institutions, organizations and individuals can react. Are the systems proposed plausible and potentially useful? If not is it because there are no needs that satellites could satisfy or because we have imagined the wrong systems? If a significant number of replies are received to these questions we will have the beginnings of a needs survey.

The proposal to merge Telesat Canada into the Trans Canada Telephone System which, if approved, will influence the use of satellites in the country for many years to come, makes this an appropriate time for Canadian institutions to give thought to their interest in satellites. The Canadian Radio-Television and Telecommunications Commission is to hold hearings into this merger in the fall of 1977 and we hope that the present study and the reactions we receive to it will help to inform the Commission of the potential of communications satellites for improving educational and social services.

2. DESCRIPTION OF THE TWO HYPOTHETICAL NETWORKS

Two networks are being investigated and costed. The first is a network linking major Canadian universities and includes a video capability. We shall call this CUSS (Canadian Universities Satellite System) or SUCES (Système universitaire canadien pour échanges par satellite).

The second network is basically an educational telephone network serving a region (province or group of provinces). We shall call this PETS (Provincial Educational Telephone System) or RER (Réseau éducatif régional).

2.1 The CUSS network

We imagine a network linking some thirty Canadian universities. Some, but not necessarily all of these would be able to emit a video (TV) signal to be received by all others and all would be able to receive and emit audio signals. There would also be a facsimile transmitting capability built in to the network. Such a system would allow Canadian universities - or any other organization which borrowed the network - to do the following things:

a) Course exchanges

Much as Carleton University is presently exchanging graduate courses in engineering with Stanford University in California, such a network would enable universities across Canada to offer a wider range of specialized courses to graduate students. A course given at University X could be followed by students at any or all other network universities. These universities would have a TV image of the lecturer (or of his blackboard/transparencies) and would hear both the lecturer and any questions he was asked. Although the lecturer would not see the students at other sites he and his class would hear all questions and discussion from these sites. The facsimile transmission system would enable lecture notes, diagrams etc. to be transmitted to all sites a few minutes before the start of the lecture.

b) Research seminars and colloquia

Few Canadian university departments have enough graduate students to justify holding research colloquia with world renowned speakers. By providing an audience in many universities simultaneously the CUSS system could encourage such colloquia. These could be either formal, (e.g. a Nobel prize-winning chemist talking about his research to chemists across the country and answering questions), or informal (e.g. a handful of specialists discussing their own research). A successful example of the latter applications was seen in the University of Quebec CTS project when bacteriologists in several cities discussed bacteria and viruses of which live images were transmitted from an electron microscope in Montreal.

c) Other applications

It seems probable that if a system such as CUSS were operational and reliable it would be used for a variety of teleconferences, committee meetings etc. by people both inside and outside the university.

2.2 The PETS network

Highly successful networks of the type envisaged have been in use for some years in Wisconsin and Illinois, to name but two US examples. The idea is to provide an audio link between a large number of sites (N~200) within a province or region. Such a system allows any site to be heard by all other sites and in the system we are costing a second channel could be used for facsimile transmission or for a graphic capability of the electrowriter type. Such a network could be used in the following ways.

a) Adult education courses

In Wisconsin some 30,000 people take courses over the University of Wisconsin Extension Educational Telephone Network each year. Such a system could be used for courses at all levels (school, college, university) and would reach into nearly all communities in the region it served.

b) Coordination

Such a province wide network would be useful to many departments of a provincial government in improving coordination with its local agents or employees. To cite the Wisconsin example once again, the ETN is used for regular meetings between the Department of Agriculture and its local agents to provide advice rapidly to farmers about markets, pest control, etc.

c) Meetings

A reliable, easy-to-use network would probably be used intensively by many governmental and educational groups for meetings of various kinds. Obviously these meetings do not have to involve all 200 sites.

3. DETAILS OF THE PRESENT COST STUDY

The study has been broken down into three components.

- Space costs (terminals and satellite) for both CUSS and PETS
- Ground and infrastructure costs for CUSS
- Ground and infrastructure costs for PETS

3.1 Space costs

This part of the investigation as well as the tying together of the whole study, will be carried out by Miller Communications Systems Ltd.

For both systems the following will be provided:

1. Estimates of capital cost per earth station to video and audio baseband interfaces assuming the use of
   - 4/6 GHz Anik I-IV type satellite transponder(s)
   - 12/13 GHz Anik IV type satellite transponder(s)

   vs signal quality, number of channels provided per station, and number of earth stations in the network. Both FM and digital transmission techniques will be examined, and near term cost trends considered. The possible future use of a broadcasting type satellite and its impact on earth station cost will be discussed briefly.

2. Technical (satellite delay, area of coverage, siting, prime power, RF equipment,maintenance) and non technical (time frame, institutional) constraints associated with each of the 4 (2x2) network configurations considered.

3. Possible full-time and occasional use transponder lease arrangements and associated lease costs in an operational system.

4. Annual cost of satellite delivery system, including earth station capital and operating costs plus space segment charge under one or more assumed lease arrangements.

3.2 Ground and infrastructure costs

These will be estimated for CUSS by Dr Don George (Carleton University) and for PETS by Dr John Daniel (Télé-université).

The following parameters will be considered.

1. Equipment costs (TV cameras and monitors and audio feedback system, telephone conference sets, facsimile equipment, graphic facilities such as electrowriters, network control equipment).

2. Maintenance costs.

3. Infrastructure and personnel (equipment operators, security, administration).

4. Instructional development (costs incurred in training instructors and adapting courses to the networks).

4. COMMENTS INVITED

The report of this study will be available in April 1977. Before that date we invite comments and reactions from individuals, institutions and organizations across the country on the plausibility and relevance of the hypothetical systems outlined.

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Nombre de réponses reçues au 27 avril 1977 = 44

Number of replies received by 27th April 1977 = 44

Distribution par province / Breakdown by province

6	. British Columbia
4	. Alberta
2	. Saskatchewan
8	. Manitoba
8	. Ontario
8	. Québec
1	. New Brunswick
4	. Nova Scotia
1	. P.E.I.
2	. Newfoundland

Distribution par organisme / Breakdown by organization

6	. Ministère de l'éducation	/ Department of education
32	. Universités	/ Universities
4	. Organisme de télévision éducative	/ Educational television authority
1	. Associations professionnelles	/ Professional associations
1	. Autres	/ Others

Commentaires généraux sur l'étude / General comments on the study

1. I am sure that in the coming years we will neet to develop an educational resource of this kind in Canada. I believe that your initiative towards it is greatly to be welcomed.....

2. I find your ideas innovative and creative and I hope they receive serious study.

3. At the present time our province does not see any economical use of satellites, given the practice of "bicycling" tapes around the province. Further our government is exploring the coordination of the extensive micro wave networks granted by the government and crown corporations.

4. I would hope that as plans develop that the possibility of developing a project which would be related to nursing education would be considered.

5. There is no longer any doubt that the level of this technology meets all conditions necessary for network quality broadcasting. We must, however, weigh the present economic, technological and logistical merits of the present delivery systems against program distribution by satellite or other budding technologies such as fibre optics and video disc.

   It appears that it is now opportune to initiate an intensive study on Communication Systems per se versus Impending Systems.

6. La première étape de la réflexion a consisté à établir des critères qui permettraient de réagir aux réseaux proposés puis à cerner les besoins de communication en éducation.

Exemple: recyclage de la main-d'oeuvre suite à un changement du milieu ou des méthodes de travail,
et
formation à l'utilisation de nouveaux instruments de travail (formulaires/équipements/etc.).

7. Both facilities would undoubtedly be used in the future if they were available, but the telephone network (PETS) would be more used in Continuing Education Activities.

8. At the level of the University at large, a satellite delivery system could well complement and greatly facilitate the arrangements being mooted here for mutual collaboration and exchange between universities on a 'twinning' basis.

9. There is no doubt in my mind that both these networks are not only plausible but also highly useful in extending the range of educational opportunities for (members of a particular profession).

10. Il est très intéressant d'aborder des hypothèses sur d'éventuels réseaux utilisant comme support le (s) satellite (s) et les deux (2) modèles proposés sont, dans ce sens, tous deux fort plausibles a priori. D'autres réseaux pourraient cependant être envisagés pour des fins d'éducation à savoir: réseau basé sur la technologie du micro-onde, ou réseau à technologie mixte avec supports tels que le câble coaxial, le micro-onde et le satellite. Cet exercice doit cependant, à notre avis, reposer sur un "cahier de charges" de besoins connus à satisfaire.

En ce qui nous concerne, et vous le comprendrez sûrement, nous ne pouvons nous substituer aux institutions d'enseignement pour identifier leurs besoins de communications et de télécommunications.

11. We are dedicated to the principle of sharing facilities, either transponders or earth stations with like or compatible users. .....We are concerned that the proposed merger of Telesat and TCTS will overlook the needs and interests of Canadian educators. In particular, we would like to ensure rate structures and services that recognize educational needs as well as our competence to own ground stations.

12. _____n'ignore pas le développement de l'utilisation des satellites dans l'éducation à un moment où le support technique aux ressources didactiques influe de plus en plus sur la tâche de l'enseignant. A elle seule, l'approche systémique de l'éducation justifierait cet intérêt ..... En résumé _____est vivement intéressée au développement des communications par satellite.

13. In general, I would support the position which you appear to be taking. I believe that satellites are vital to education package delivery such as we have in (the north of the province) and, of course, even more so in the Arctic regions of Canada. My personal feeling is that much of their future lies in the direction of computer-aided instruction rather than the conventional method of professorial delivery. However, what you propose is entirely feasible.

14. The physical systems which you describe seem to be well-conceived and could, no doubt, be put into operation. Whether or not the overall objectives of such systems would be met would be dependent on factors outside the system but impinging on it. I am referring to the need for adjustment to the related social systems with which your system must interact.... Accommodation of your systems within the larger educational and social systems requires at least as much, and probably much more, time devoted to it than the design of your delivery systems and their information content.

16. As a small university restricted to undergraduate work, I think it is very unlikely that we would originate material for such a system. Our use of it would be very much determined by cost. Given my general pessimism about University funds in the near future, I am doubtful that funds will be available even for things that in the long run might have economic benefits.

17. It is eminently sensible to proceed as you have done, to investigate costs of video links and of telephone links, since any conclusions concerning the uses of a communication network will include consideration of both capital and operating cost.

    The use of interactive electronic media for course delivery must be compared with other more traditional means. It does not appear that there will be a shortage of university teaching personnel in the long term. The many institutions using passive television delivery systems have not shown them to be cost effective. The legitimacy of the use of a television network to deliver nationwide a course of lectures from a single source must be established - is the subject matter (especially for a graduate student) the important aspect of his course, or is it the intimate contact with a researcher, the development of an analytical expertise?

18. Unfortunately the technology, and perhaps the decisions being taken by the major carriers and regulatory agencies, are still ahead of the decisions that can be taken at this time by users. This is not to say, however, that users won't soon want to be able to create networks such as CUSS and PETS. Factors such as cost and the regulatory environment will certainly influence the decisions taken by users and therefore it makes sense to continue to try to cost the various alternatives and to encourage policy decisions that take the needs of non-commercial users into account.

19. In a general way, our Province is interested in investigating any form of technology, including satellites, which has the potential to lower the

cost of undertakings in which we are presently involved. It is in keeping with this interest that we would support your efforts to investigate the two networks.

20. En tant que membres d'une institution universitaire de modestes dimensions, nous serions évidemment très intéressés à utiliser les services offerts par un réseau de télécommunications, ce réseau pouvant nous permettre d'avoir accès à une information actuellement hors de notre portée.

    Dans la conjoncture actuelle, il nous est difficile de nous prononcer sur l'un ou l'autre des réseaux proposés, mais je voudrais ici réitérer notre intérêt pour votre projet.

21. I wish to express active interest in your investigation.

22. I find that we are at least non-committal if not lukewarm, about the need for satellites in Canadian education. We are convinced, however, that the two networks that are proposed are technically feasible.

    The cost of these networks relative to the cost of other means of providing education will, of course, be a central consideration in reaching any judgement about the uses of satellites in Canadian education.

23. It would be very helpful for us to have the report of the cost study before we make a formal response since, although there is some advantage in some reactions to hypothetical systems, some of us are skeptical as to the cost benefit results of a satellite network system.

    It is encouraging that studies of this type are under way as the benefits are clearly very great. As someone with personal knowledge of space research, however, I would have to be convinced that the capital and

operating costs of such a system would not be put to better use if, for example, they were added to the granting agencies for grants in aid of research. On the other hand, if money for this project became available at the federal level which would not otherwise be available to education in its broadest sense, our attitude would be very different.

.....I am mindful of an earlier similar kind of experiment called EDUCOM which generated great enthusiasm 10 years ago with the possibility of linking large data bases through comprehensive computer networks, appears to have sunk without trace.

24. If I have to choose between audio communication which can be widely used by each institution and a video system which would be of use only to an elite and much smaller number, I would choose the audio. Of course, if the video capability could be built into the network for individual institutions in reaching their own geographic communities, that would be even better.

25. First, my own experience and investigation leads me to believe that some major obstacles to the use of a satellite system linking the universities for the delivery of courses, seminars and programs in the credit mode to both graduate and undergraduate levels will prevent any major development in this area. These obstacles will be focused through existing faculty unions and those faculty unions which will come into existence over the next few years. Primarily they will represent a fear by faculty members that the development of a system of satellite connections will represent a threat to the employment of university professors. I would be willing to discuss this question further but I merely flag the issue for your attention for the moment.

In spite of my rather pessimistic views expressed in the preceding paragraph I have strong feelings about the potential value of such a system for the development of adult education programs at the university level. Here I see a wonderful opportunity to tie together some of the key resources available throughout the country to supplement existing programs, especially those in the growing area of professional adult education.

26. As a final pessimistic note, I would strongly suggest that any attempt to implement either of these schemes should include either the flexibility to convert it from educational to some other use or a large budget item for promoting its use among academics. The history of educational technology is strewn with the expensive relics of schemes that offered all sorts of theoretical advantages but which higher education did not consider worth trying out in any significant way.

27. Basically the proposal makes eminent sense both in relevance and plausibility.

Specifically, because of the rather small size of the University of _____, the use of the CUSS Network for research seminars and colloquia would be extremely important.

A system similar to the PETS network would assist many _____ residents in obtaining education from both universities. This system combined with a video tape lecture might also bear investigation.

As much as I am heartened by the increased impetus towards the use of more technology in the use of instruction, I am not too optimistic that the Province of _____ will divert money to Universities for the development maintenance and research required. Community Colleges may fare better.

I would be interested in some of the costs now in place for those locations where systems similar to those described are being operated.

28. It seems to me and to many of my colleagues, that all of the money spent or proposed to be spent on these systems for Universities would be <u>better spent</u> on honoraria for guest lecturers, travel grants etc. Face-to-face contact is still the best.

29. I am certain that if we had access to these resources, there would be a development of much use by not only the university community but government or other agencies. It would take time to learn to use them to the optimum value. The limitation (in addition to the usual cost factors) would be the ingenuity of the users in maximizing the potential.

30. I have read this project with great interest. Linking various parts of Canada through a satellite communication system in view of teleconferences is overdue.

I would like the planners to consider setting a network of teleconference centres in various parts of Canada. These centres would not be necessarily set on university campuses, but could be set in the downtown area of a city, providing access to the teleconference centres to academics as well as other users: Businessmen, federal or provincial government civil servants, private research organizations, etc.

The centres would be financially self-sufficient by renting the use of their premises to the various users. This would necessitate the formation of some kind of a crown corporation linked to the DOC which could be named "Teleconference Satellite Network Canada", or something of that sort.

The big conference centres should be equipped with permanent 3 meter antennas, the smaller ones with 2 or 1 meter antennas only. The Teleconference Satellite Network should also be equipped with mobile antennas (3, 2, and 1 meter) such as the ones being used by the Hermes experiments, in order to be able to extend teleconference type situations between communities not linked permanently by the proposed network on a temporary basis.

I advise the planners to contact the French government, which has recently established teleconference rooms in various parts of France, which will be used on a rental basis.

In summary, I would strongly suggest that the planners get out of the university community and link their project with the administrative and business worlds. Short of doing this, I am afraid that their project, however beautiful it may be, will be tabled and will gather dust, like so many other beautiful satellite communication projects have gathered dust in the past ten years.

31. I have discussed the outline 'Satellites in Canadian Education' with my colleagues and we feel that at this stage either CUSS or PETS would be very expensive and under utilised, at least in the context of metallurgical exgineering. In theory the PETS system would be of value because it could encompass off-campus events, e.g. on-site transmission from engineering plants etc. However, one really has to weigh these advantages against use of simpler A.V. packages such as video tapes of lecture series etc. The real advantage of the latter is that the quality can be so high, e.g. the Bronwoski 'Ascent of Man', Clark's 'Civilisation' etc. This has real value to be set against the simultaneous education system.

Our feeling is that although the satellite system has long range benefit to education in general, e.g. preservation of minority cultures at the

university level, it does little to enhance the quality of education.

32. Overall, the group was favorable to the proposal of an information network between Canadian universities. There is a need for more efficient and effective means of communicating all kinds of information - from courses to student transcripts - from one Canadian university to another. It was also felt that both of the proposed networks would facilitate computer conferencing, packet switching and other forms of information exchange. A satellite-based network would also most probably mean a vastly simplified price-structure for users.

Within this generally positive reaction, questions were raised that the group felt should be addressed before going ahead. These are as follows:

1. Will the proposed networks provide a service that is substantially better than what existing microwave networks can provide? Related to this are questions such as whether existing systems are saturated now, or will be by the time the proposed networks are functioning? We should ascertain that our present systems are being used to full efficiency before setting up the new networks.

2. Is there sufficient demand to warrant setting up the new networks? The group expressed some doubt that there was enough demand to make the networks cost effective. Are institutions ready to engage in large-scale exchange of courses, speakers and so on? Probably not on the scale required to make the networks efficient. The group suggests that expanding the proposed networks to include <u>all</u> sources and consumers of information, not just universities, would assure a more efficient use of the systems.

3. Will the technology required to mount the proposed networks have changed sufficiently in the interim to permit more ready access by users to information? The group felt that there was a need for more smaller ground stations rather than fewer more sophisticated ones. It seems likely that "receivers" of various kinds will soon be available in affordable price ranges. It was felt that these should be set up so that no one in Canada would be more than 200 miles from one.

4. By contrast, some thought was also given to the question of fitting networks into the limitations of existing technologies. The ultimate consumer of information provided by an information network is unlikely to have anything more sophisticated than a television and a telephone with which to gain access to the network. Perhaps these are sufficient to service the present needs of individuals.

5. Even if the proposed networks are not paying propositions, there may be other long range payoffs. Eventually, using world-wide networks, information, such as educational programmes, could be exported to developing nations.

6. What effect will political events have on the proposed networks? If in fact communication becomes, wholly or in part, the responsability of the provinces, attention will have to be given to the interconnections between provincial networks. This has political and possibly technical implications.

If the proposed networks make further progress towards becoming realities, the group is willing to participate as best it can. We are looking forward to news of any further developments.

Commentaires sur le réseau SUCES / Comments on the CUSS network

1. The Cuss Network

While this sounds very exciting, I wonder if it will be used sufficiently to merit the cost of setting up such a network. Such a system would require that universities communicate frequently and be very aware of what others are doing. It seems to me that most faculty have difficulty just keeping abreast of programmes in their own universities. In fact, we have some capability for similar forms of communication now. Most universities have video equipment and may regularly tape courses.

In Social Work, we have talked for several years about exchanging information by video for some of the situations mentioned in the proposal. This exchange does not seem to be much used. A system to catalogue resources of various schools of social work across Canada has also broken down and we have not had much pressure from either individuals or schools to complete the project.

2. It is our opinion that the CUSS network you describe is sufficiently plausible to justify a detailed study.

3. At present, there is a broadband audio and video service linking (a university medical school) local hospitals and other medical institutions. This system can also be linked to major medical schools and hospitals (in a region of the US). (A UNIVERSITY) has been involved in at least one scheme which effectively achieved the same result as you propose but made use of a microwave network.

4. The CUSS network would appear to be somewhat of a luxury since the activities which it makes possible are not really necessary.

7. The model proposed for universities, CUSS, would have some utility for _____ to the extent that we produce programs using experts from universities, as well as soliciting their reactions to programs, and such a system could provide real time interactive television for insertion in the distribution system. In addition, such a system would have utility for teleconferencing for program development and for dialogue with regional representatives.

8. There are also systems very similar to the CUSS networks that you describe, the only difference being that the linkages are at present microwave, rather than satellite. The TAGER network in Texas is typical of these systems and involves hookups between northern Texas universities and industrial research organizations for a mutual exchange of course offerings and research insights.

9. .....you suggest that facsimile transmission could be used to deliver lecture notes to remote spots. The only inexpensive transmission systems which I know take for too long to do anything other than deliver a fairly simply diagram. Certainly they would probably have neither the resolution nor certainly the speed to deliver a package of lecture notes remembering that some professors may issue twenty or thirty pages of such notes per lecture. Apart from this, all seems to be well.

10. No demand exists at present for a national university communications satellite.

11. I think the CUSS network would not only be plausible and useful but a very exciting development in Canadian 'Higher' Education. I foresee particular benefits which would result across the country at the graduate level.

12. The sort of networks you outline could have great potential for the 10 Canadian Faculties/Schools of _____ which have the greatest difficulty keeping in touch with each other's developments.

13. Both the CUSS and the PETS networks would be of interest to _____ for continuing education program development and for increasing learner contacts. The CUSS System would provide only a limited value to _____ but the PETS network could be used on a very regular basis.

14. As far as the CUSS network for universities is concerned from the point of view of a Department of Education involved only in K-12 education this is, if you will excuse the expression, an academic question. We have examined the applications advanced by Telesat Canada and have concluded that, in the foreseeable future, there is no applicability for public school education. We are looking seriously at microwave links between a central resource point and local cable distribution points, but not at satellite applications.

15. The CUSS network. Inasmuch as there is a very limited number of people in nursing who hold Doctorate degrees and are involved with nursing research to have this kind of network linking the Canadian Universities would be invaluable in terms of developing research scholars. The possibility of course exchanges would also seem to be a possibility for nursing to investigate.

16. I have read with great interest the suggestions you have made concerning the use of a network linking some thirty Canadian Universities. There would probably be some problems of timing if this was all to be interpreted as live television, but hopefully it might be the first step towards a facility which would permit some videotapes to be seen in classrooms across the continent and this would be a valuable educational opportunity.

17. The CUSS network seems to represent a considerable advance in communications capability that could be put to use to provide advances in educational practices and contact among researchers. The ability to permit two-way communication between researchers and advanced students in areas of study involving limited numbers of people would seem especially valuable, as it would help to overcome the problems caused by the fact that invariably no one institution can afford to maintain enough people in a limited area to create an intellectual "critical mass".

18. From the brief paper provided it would appear that the CUSS network has exciting possibilities. No doubt it would take some time for universities to coordinate programs in such a way as to realize the full potential of the network. Because of the regional nature of many aspects of a Teacher Education program, the network would not be useful for certain components. On the other hand unusual procedures, programs or courses at some universities would be available to all on the network.

    Perhaps the network would lend itself to student-supervising teacher-faculty member interaction among universities. A seminar discussion might be held at one university and reactions received from others in the network. Maybe such seminars could even decrease the necessity of some conferences. It would be an easy way of ensuring that universities are aware of current programs and experimental procedures in the network. Quite often we hear of some research (or experimental programs) in progress but the final outcomes are published much later. Through CUSS it should be possible to maintain continuous contact with the experiment to its conclusion.

19. Thank you for the opportunity of reviewing the proposal for Satellites in Canadian Education. After some thought and analysis we here at _____ are particularly interested in the video hookup by means of the

communications satellite. Although we are conscious of the provincial base of colleges and universities, there clearly would be greater educational opportunities for a communications network that spanned Canada and included video capability.

Otherwise the media facility within the _____ Radio and Television Arts program and the Media Centre, represents one of the most sophisticated production centres in North America. We currently have three full-fledged colour studios with "industry standard" equipment, time base correctors, 2" high band recording and editing capacities, as well as transmission lines to and from a major amphitheater type classroom. What is more, we have in our faculty and on our Media Centre staff the talents to piece together programming material which would be worthy of the considerable expense represented by your exciting concept.

Thus, while each institution might choose to have some modest recording and transmission facility, _____ - with minimal addition to its existing capacity - could play a major role in offering resources for this new use. I am certain that funding agencies might find the idea more attractive if they thought that a totally new expenditure was not involved. Furthermore, it is interesting that your idea should surface at a time when _____ has taken pains to ensure that its media equipment inventory is closely related to the highest standards in the professional broadcast community. Last summer approximately $300,000 worth of new cameras, recording and switching facility was added to an already impressive array of equipment. At the moment we have changed our emphasis to stereo radio equipment within our radio training branch, and - through an aggressive contact with the industry - we foresee expenditures at the end of this year amounting to an additional fifty to sixty thousand dollars.

To conclude, we here at _____ are enthusiastic about your proposal. We would be happy to assist you in any way to mount this project. This assistance might include technical advice, evaluation of proposed equipment, teaching modes, production designs, recording, storage and utilization of tapes, and the involvement of our broadcast teaching faculty as resource people.

20. Le réseau SUCES

L'asymétrie des ressources de communications entre les différents partenaires de ce réseau nous apparaît malheureux. Il serait grandement préférable de concevoir un réseau distribué où chacun serait tour à tour émetteur et récepteur vidéo.

Quant à la possibilité pour chacun d'émettre et de recevoir en audio par satellite, nous estimons que le satellite n'offre pas d'avantages ni technologiques, ni économiques par rapport au réseau téléphonique terrien, sauf pour des distances de l'ordre de plusieurs milliers de milles.

L'échange de cours envisagé comportera, d'autre part, des problèmes au niveau de la langue et de la compatibilité des curricula.

Commentaires sur le réseau RER / Comments on the PETS network

1. I personally believe that the people of British Columbia and their educational institutions could receive greater benefit from the second (PETS) model.

   Because many people in the non-metropolitan areas of British Columbia have limited access to educational opportunities, a Provincial Education Telephone System would have considerable value to these people and to the universities and colleges serving their educational needs. Most of the population of British Columbia is concentrated in the Southwest corner and all three universities are located in these major population centres. The universities currently offer correspondence courses and occasional off-campus lecture courses, but these programs have severe limitations in both scope and quality. The interior of the Province is served by 14 colleges located in the smaller population centres, but the ability of colleges to reach the people in small neighboring communities is limited by distance and poor road conditions. These realities clearly suggest that some system of distance education will be required if the people who are geographically or socially isolated are to have equal access to educational opportunities.

   From my perspective, the advantages of the second model are that:

   1. it would appear to be a less costly system;
   2. It would serve more people and provide greater access to educational opportunities to those who are geographically or socially isolated;
   3. it would enable existing educational institutions to improve the quality of existing distance education programs by providing opportunities for direct, immediate contact between instructors and students and among students;

4. it would enlarge the range of options by which the colleges and universities in B.C. could develop new low-cost distance education courses and programs;

5. it would be of value to the new university college that the B.C. Department of Education is considering for the interior of the Province.

I appreciate very much being given the opportunity to comment on your survey and will look forward to hearing the results.

2. The PETS network. The need for providing educational programmes for nurses in rural areas is an acute one indeed. The PETS network as you describe it would seem to have much possibility in reaching out to nurses who intend to continue on with their education.

3. The PETS network, on the other hand, may have some potential, In particular, we would be interested in its application to Government Correspondence School instruction. As I understand your proposal, the PETS network would differ from the standard conference telephone call in that a facsimile transmission capability would complement the stricly audio signal.

4. Demand does exist for a provincial telephone network - particularly for _____ operations.

5. The PETS model would have no utility for us at the present time since _____is not in the business of delivering educational materials to end users apart from some of our broadcast and videotape offerings.

6. My colleagues have suggested that the educational possibilities of this community's technology should be further explored, initially in the context of a provincial (PETS) network. A word of caution has, however, been voiced concerning the degree of public interest in such education or the ability of post secondary institutions to provide the resources necessary for such a project.

   Nevertheless we believe that the system has considerable potential for creating new modes of post-secondary education. It has also been suggested that it may have special value for community-based clinical educational programs for physicians in remote areas and we would encourage you to explore these possibilities further.

7. Satellite et collège (R.E.R.)

   Ce deuxième projet, qui intéresse l'ensemble du réseau collégial, nous est présenté avec une économie d'imagination peu favorable à un emballement collectif; par contre l'intérêt d'un tel réseau est certain.

   - L'utilisation des supports technologiques dans la pédagogie au niveau collégial nous permet de croire à l'avenir d'un réseau audio reliant l'ensemble des collèges. A ce titre, l'expérience de la radio M.F. de la zone économique no. 4 mériterait d'être aidée un peu à la façon d'un prétest pour un tel réseau.

   - Aux aspects positifs déjà soulignés à propos du satellite et l'université, on peut ajouter qu'un réseau audio, beaucoup plus modeste dans ses coûts et simple dans son utilisation, pourrait permettre l'établissement d'un réseau de communications entre les collèges, d'un réseau d'échange de cours et d'une gestion de l'acte pédagogique à peine soupçonnée actuellement.

9. The PETS network on the other hand might serve as a course delivery system which supplants correspondence and also the live presence in extension education: it would thus be a replacement and not an additional cost.

10. PETS - our experience with a 3 month experimental use of a telephone teaching, teleconference system involving 2 towns, was certainty positive, but a longer trial period involving more points and a more systematic evaluation would be necessary before we would even decide to try to set up a Province-wide network, let alone a regional one.

11. The second network, the PETS, has interesting implications for our Atlantic Provinces where we are trying to coordinate parts of our educational planning. Its use in this instance is more likely to be for meetings of planning groups rather than for formal educational programs as suggested in your paper.

12. I think it is urgent that (our institution) get into the satellite education field. .....we did research on the PETS model. Although I do not have the report of our work in front of me I do remember some of the results clearly.

    1. Each site needed a skilled facilitator.
    2. Professors were not happy. The major reason was that they could not anticipate feedback questions in time to feel confident.
    3. Learners were dissatisfied because they could not either keep the line to carry on a dialogue, or they could not get the line when they wanted it.
    4. As a tool for knowledge and information dissemination it was very useful and efficient. However, we felt a computer terminal hookup would ultimately be cheaper and more efficient once the information was programmed.

5. Facsimile transmission required the performer (Professor) to the more graphic than he usually was prepared to be.

6. Generally we concluded that if one were to go into this the following needed to be done:

    a. The system must be video
    b. Learning materials must be more standard
    c. Experts must be shown at work in a technical way, e.g., artists painting, scientists in laboratories, adult educators facilitating, etc. This rules out the learned lecturer.

For us in the Adult Education Training & Development field a video satellite for our graduate students would be a great asset. It would also provide us with further opportunity to develop learning packages which we could facilitate in places such as the North right here from our Adult and Continuing Education Centre.

13. The PETS Network

This proposal appears to me to have a great deal of merit--while not having as much glamour as a cross-country system which provides both visual and audio transmissions. I think it would be much more useful to individual programmes and institutions. It would certainly be most helpful to our programmes in social work as we seek to make our regular programme more accessible to working people or to people who live outside of _____. In addition, it would facilitate our communication with a variety of people--students who might be placed for part of their training in rural or northern communities; graduates who are scattered throughout the province and need some regular, readily accessible form of keeping in touch with new thinking; and perhaps providing access to special resources

15. The PETS network is of course much more limiting. It is somewhat reminiscent of the VERB (Visual Electronic Remote Blackboard) system we tried in Saskatchewan in 1965-66. That system connected Regina to four stations via telephone. It provided audio links (any site could hear all sites) and visual link by permitting transmission of writing from the main center to the four stations. There appeared to be a limitation of the type of courses that might be appropriate for such a system and likely this will be true of PETS. However, it is possible by careful planning to do more than what first appears to be feasible. For instance, sending data by mail in advance of a formal lecture and discussion would be one way of increasing the utilization of a system.

    Some interchange (discussions, seminars) could be usefully held via PETS almost as profitably as through CUSS. Certain presentations which do not require visual aids could certainly be made via the former.

16. Le réseau RER

    L'opportunité et l'intérêt de l'utilisation d'un satellite de communication pour la mise en place d'un réseau audio ne nous paraît pas des plus évidents. Basée sur les conclusions de travaux de recherche que nous avons faits, l'utilisation du réseau réléphonique dans ce cas nous paraît plus rentable à première vue.

for isolated practitioners or local community people who are trying to resolve complex difficulties. I know that similar parallels exist for a number of other schools of social work across Canada. For example, Memorial University has nearly all of its students placed in locations throughout Newfoundland for their final year; the Maritime (Dalhousie) and Moncton Schools are also moving to decentralized provision of programmes; Laurentian, Lakehead, Regina, Calgary, Victoria are similarily attempting (I believe) to provide some instruction off campus or to use decentralized learning at least for a part of student learning. What is significant here I think is that we each need to find ways of communicating with people in a variety of locations without having the cost of travel for either students or faculty. In addition, we are concerned here with basic education-- not with advanced of unusual or special programmes. For me this is a major reason for focusing on local needs and a better way of meeting these--as opposed to specialized needs for a small fraction of programmes. In our School, we do have a graduate programme but the delivery of graduate instruction seems less problematic to us at this time than the delivery of regular and continuing education needs to those outside of_____.

In Ontario and Quebec where universities are close together, it seems to me that the PETS network could meet the needs of both individual institutions in delivery of their programmes and for exchange among programmes.

14. Unless the PETS network involves significant advantages in costs or quality of communication, I don't see why it would offer any improvement over present telephone service facilities.

Autres commentaires / Other comments

1. Quant à la seconde question que vous posez: quels autres types de réseaux seraient utiles? Nous désirons attirer votre attention sur l'utilisation faite en Europe de la radiovision qui s'est avérée concluante dans le domaine de l'enseignement à distance.

2. A third model that would have great utility for us would be a system that replaces our temestrial microwave system, as well as providing the capacity for origination from one of five regions. Such a system could feed conventional broadcast transmitters, cable systems, and master antenna systems, and hopefully at the same time receivers or convertors would be within the economic range of individual homes.